

ENTOMOLOGICAL CONTRIBUTIONS.

BY HENRY HACKER, F.E.S.

(Plates XXXI, XXXII.)

NOTES ON COLLECTING HYMENOPTERA.

WHILE some of our wasps and bees have a wide range, many of them are very local; consequently the number to be obtained in any one locality is usually not large and is greatly influenced by the climate, soil, and flora. In Queensland the richest localities are contained within the coastal strip of country between the sea and the Main Range. One might think that the Northern scrubs or rain forests, with their dense tropical vegetation and a hot steamy atmosphere, would be an ideal place for Hymenoptera, but it is not so. As the majority of the wasps and bees make burrows and nests in the ground, it is essential that both they and their food supplies be kept dry and free from conditions favourable to the growth of fungi and moulds. Consequently a comparatively dry climate, together with a light sandy soil in which the fossorial species can easily burrow, will be found the most favourable habitat. The flora also is an important factor; districts with a varied flora, the flowering periods of which extend over the whole summer, will obviously support a much larger population of bees than a locality where the plant population is limited and the flowering period lasts only a few weeks. This applies to the domesticated as well as the wild bees.

The best collecting grounds for Hymenoptera in the Brisbane district are on the South Coast line at Sunnybank, Birkdale, and Cleveland, and on the North Coast line at Caloundra. Stradbroke Island, which consists mostly of pure sand, is very rich in Hymenoptera. It is also remarkable in possessing several species of Thynnidae which, while occurring commonly about Sydney, have not yet been recorded from the Queensland coast.

In most localities in South Queensland, bees and wasps make their appearance in early spring, simultaneously with the flowering of *Leptospermum*, which generally commences about the last week in August and continues throughout September. After this spring burst of insect life there is a constant succession of fresh forms until the hot midsummer, when a lull takes place. Although the species are more numerous at this time, the specimens are less plentiful, and require to be specially searched for in favourite localities. After the summer rains,

when the weather is settled, there is an autumn burst of life which consists chiefly of the second brood of the same species which appeared in the spring, although generally speaking they are not so numerous as the first brood.

When the *Leptospermum* flowers are beginning to open one can pick off any desired insect with the net without any difficulty; later on it is not so easy, as it is impossible to catch one without getting a dozen other insects at the same time, and sometimes the desired specimen escapes in the confusion. The plan which I adopt is to pass quickly among the flowering bushes, sweeping the insects off with the net before they have time to become alarmed. When the mass of insects, petals, leaves, &c., at the bottom of the net have accumulated into a good-sized ball, I put it together with part of the net into a wide-mouthed killing bottle for a few minutes; it can then be safely turned out into the killing bottle and another "sweep" made. By this means numbers of minute bees and wasps are captured which would otherwise be overlooked.

Another good method of collecting Hymenoptera, and one which proves very successful when the conditions are favourable, is to take note of all the dams and waterholes in the district to be collected over, and then visit them in November or December. About that time they will be nearly dry and the mud around the edges will be visited by many fine wasps and bees. Some of the wasps go to obtain mud for cell-making; some predatory species go to capture other insects; while the bees go to satisfy their thirst and also to obtain water for their larvae. Every beekeeper knows what a large quantity of water the bees require in the spring when brood-rearing is going on. The wild bees under similar circumstances also consume a quantity of water.

An unusual method is the following, which is copied verbatim from my note-book:—"On November 18th I happened to be collecting in the neighbourhood of Sunnybank. It was one of the hottest days experienced this season, and in addition a hot wind was blowing. No insects were to be seen on the wing, and my prospect of obtaining anything on such a day seemed small. While passing a large eucalypt which was in flower I noticed a few large Diptera on the side which was sheltered from the hot wind, and on closer examination found scores of insects belonging to nearly all the orders, the Hymenoptera and Diptera predominating. There were also a fair number of Hemiptera, while Coleoptera were in great numbers under pieces of loose bark and in every crack and cranny. The remainder of the day was spent in examining similar tree-trunks, the result being a record for one day's collecting. In Hymenoptera alone fifteen species of bees and forty-seven species of wasps were taken on the sheltered sides of these trees." Evidently the insects had been attracted to the flowers earlier in the day; but the intense heat, together with the hot wind, drove them to the trunks for shelter.

A final word of advice is to collect flower-frequenting species in the morning. The flowers yield their nectar freely in the forenoon. In the heat of

the day this nectar dries up and the flowers consequently lose most of their attractive power. My experience is that one hour's collecting in the early part of the day is more productive than that of two hours in the afternoon.

NOTES ON NESTS OF *MONEREBIA* *EPHIPPIUM*, Fabr.¹

A fine nest of this wasp was found at Sunnybank on July 13th, attached to the inside of a hollow log lying on the ground. It was about seven inches long, four inches wide, and contained ten cells. The cells were made of sand mixed with clay, and were arranged alternately in two rows. The walls of the cells were very thick, and the entire nest had such a massive appearance that it was hard to believe it to be the work of a single wasp. In this particular nest the usual funnel-shaped entrance had been broken, only a small portion being left attached to the nest. On two previous occasions I have found nests of this wasp, and each was furnished with a funnel-shaped entrance.

Six of the cells contained full-grown living larvæ. The interior of these cells was beautifully smooth, and was lined with a thin silken membrane resembling tissue paper. The outer side of the nest was of clay which had been plastered smooth, so that it had a shiny or greasy appearance. The clean, smooth appearance of the interior of these cells made one wonder what had become of the excreta and débris of food. On further examination it was found that at the end of each cell, outside the silk lining, between that lining and the wall of the cell, there was a cavity into which the larvæ had closely packed all excreta and débris.

Two of the cells were found to be full of dead caterpillars (all consisting of the same species, *Clania ignobilis*, Wlk., belonging to the family Psychidæ), empty puparia of Tachinid flies, dead Tachinid flies, and some excreta.

The contents of the first cell were fourteen dead larvæ of *Clania ignobilis*, nine empty puparia of Tachinid flies, six dead Tachinid flies, three dead Tachinid flies still contained in puparia. The second of the two cells contained fifteen dead larvæ of *Clania ignobilis*, eleven dead Tachinid flies, eleven empty puparia of Tachinid flies.

Judging by the contents of these two cells, it would appear that the caterpillars were parasitised by Tachinid flies before being placed in the cells by the *Monerebia*. The young *Monerebia* larvæ had starved owing to the Tachinid larvæ having consumed the most nutritious portion of the caterpillars. The adult Tachinid flies had died after successfully emerging from the pupal state, because of their inability to leave the sealed-up cells.

Two other *Monerebia* cells were found to be occupied by living larvæ of a smaller species of wasp, *Pison aureoscrisum*, Rohw. Both cells had been divided

¹ I have used the name *Monerebia* instead of the better-known *Abispa* on the authority of Meade-Waldo (Ann. & Mag. Nat. His., p. 461, 1914).

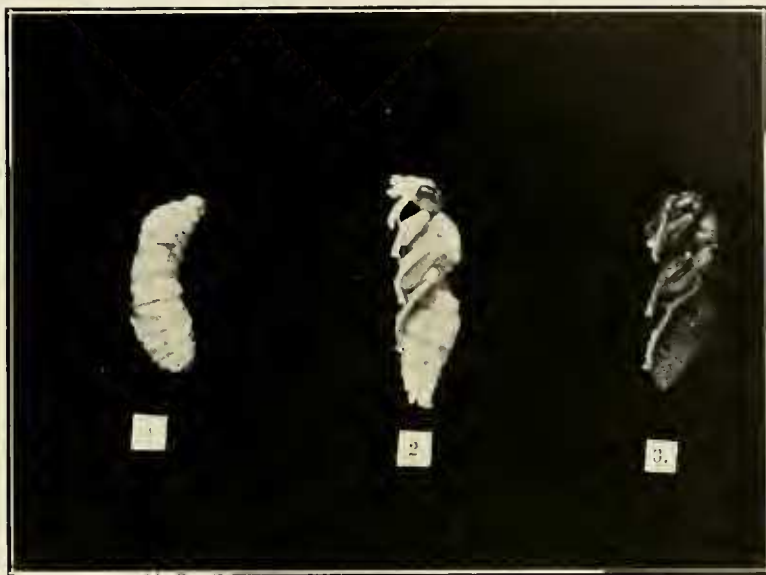


Fig. 1.—*MONEREBIA EPHIPPIUM* Fabr.
1, Larva; 2, pupa (early stage); 3, pupa (later stage).

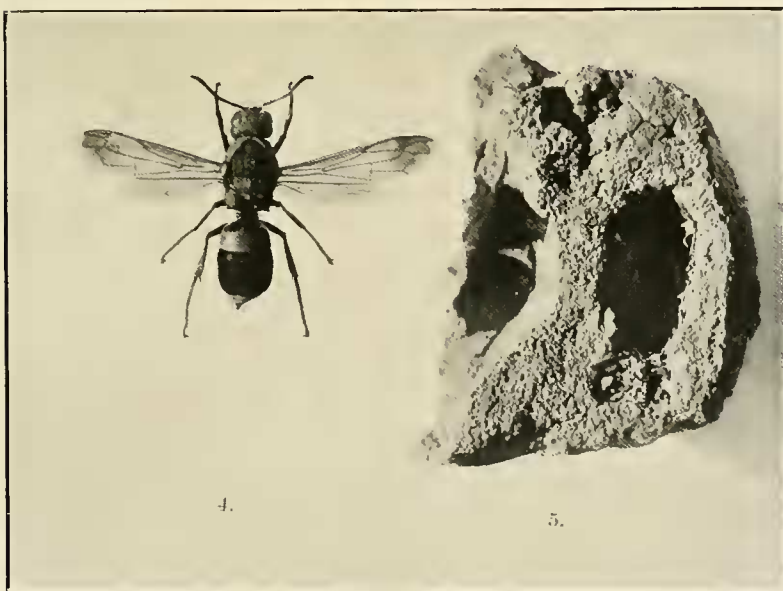


Fig. 2.—*MONEREBIA EPHIPPIUM* Fabr.
4, Adult wasp (female); 5, part of nest showing excreta packed in end of cell.
All Natural Size.

into three smaller cells by means of two transverse walls of clay; each of these smaller cells was occupied by a larva of *Pison aurcosericum* enclosed in a yellow semi-transparent skin. They were all lying transversely to the longitudinal axis of the *Moncrebia* cell.

These seem to be instances of "appropriation." The cells had been left empty for some reason, and had been taken possession of by *Pison aurcosericum*, but finding them too large for its purpose it had divided each cell into three smaller cells. Two of the *Pison* larvæ were parasitised by a dipterous insect belonging to the genus *Anthrax*. These parasites emerged on September 25th, and left their empty pupal cases protruding half through the wall of the cells.

The *Moncrebia* larvæ remained in a dormant or sleeping condition within their cells throughout the winter; most of them changed into pupæ during the last week in September. The pupa is not enclosed in a skin or cocoon, but lies quite nakedly within the cell; when newly changed it is pale yellow, with the exception of the abbreviated wings, which are deep amber. The outline of the future wasp is very distinct; the antennæ lie straight down in front along the outer side of the mandibles; the legs are packed close to the sides; even the segments of the abdomen are quite plain, and can easily be counted. When the pupa is a week old the eyes become dark-brown, the other parts remaining the same colour as before. During the third week the black and orange colours of the adult begin to show; the black second segment of the abdomen and the mesothorax showing very distinctly. The adult wasps emerged about a month from the time they pupated.

With regard to the funnel-shaped entrances to the nests made by *Moncrebia* and a number of other Eumenid wasps, I am of opinion that they are constructed as a precaution against ants and other marauding insects. In one or two instances which came under my notice they were made quite early in the construction of the nest, and were used for entrance and exit by the female wasp while storing the newly made cells with food. As the cells would necessarily remain open and exposed until they had received their full complement of provisions, it can be easily seen what a protection a funnel would be. All the nests found by me were in dark corners and crevices, and the mouths of the funnels were in all cases pointing downward. It would be a bold insect that would venture far up a smooth and slippery funnel in almost total darkness. After the work of provisioning and ovipositing inside the nest is finished, the female wasp closes the hole at the base of the funnel with a plug of clay. The funnel is then of no further use, as it is not needed for the emergence of the young wasps, each of which issues from a hole cut through the end of its cell.

The industry of *Moncrebia ephippium* can be best realised by the fact that this nest weighed eight ounces. In addition to this, and taking fourteen larvæ as the average contents of each cell, the wasp must have caught at least 140 larvæ of *Clania ignobilis* to furnish food for its progeny.